

**University of Mumbai**  
**Examination 2020 under cluster \_\_\_ (Lead College Shortname)**

Program: Computer Engineering

Curriculum Scheme: Rev 2016

Examination: Second Year Semester III

Course Code: 301 and Course Name: Applied Mathematics III

Time: 1 hour

Max. Marks: 50

For the students:- All the Questions are compulsory and carry equal marks .

Q1.	$L(e^{-2t} \sin \omega t)$ is
Option A:	$\frac{1}{s^2 + \omega^2}$
Option B:	$\frac{\omega}{(s+2)^2 + \omega^2}$
Option C:	$\frac{s+2}{(s+2)^2 + \omega^2}$
Option D:	$\frac{2}{(s+\omega)^2 + 2^2}$
Q2.	$L^{-1}\left(\frac{1}{s(s-3)}\right)$ is
Option A:	$\frac{1}{3} + \frac{1}{3}e^{3t}$
Option B:	$-\frac{1}{3}e^{3t} + \frac{1}{3}e^{3t}$
Option C:	$\frac{1}{3}(e^{3t} - 1)$
Option D:	$\frac{1}{3}(1 - e^{3t})$
Q3.	The regression line of sample are $x + 2y = 6$ & $2x + 3y = 8$ find Sample mean $\bar{x}, \bar{y}$
Option A:	-2,4
Option B:	2,4
Option C:	2,-4
Option D:	-2,-4
Q4.	$L^{-1}(\log(s^2 + s))$ is
Option A:	$\frac{e^{-t} + 1}{-t}$

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Option B:	$\frac{e^{-t} + 1}{t}$
Option C:	$\frac{e^{-t} - 1}{t}$
Option D:	None
Q5.	$L^{-1}\left(\frac{s-1}{s^2-2s-5}\right)$ is
Option A:	$e^{-t} \cos 2t$
Option B:	$e^{-2t} \sin 2t$
Option C:	$e^t \cos 2t$
Option D:	$e^t \sin 2t$
Q6.	If $f(x) =  x $ in $(-1,1)$ then the fourier co efficient $a_n$ is
Option A:	$\frac{2((-1)^n - 1)}{n^2 \pi^2}$
Option B:	0
Option C:	$\frac{4((-1)^n - 1)}{n^2 \pi^2}$
Option D:	$\frac{4((-1)^n + 1)}{n^2 \pi^2}$
Q7.	What is the fixed point of $w = \frac{5-4z}{4z-3}$
Option A:	$\frac{5}{4}, -1$
Option B:	$-\frac{5}{4}, 1$
Option C:	-5, 4
Option D:	5, -4
Q8.	Fourier coefficient $a_0$ of $f(x) = 2x - 1$ in $(0,3)$
Option A:	3
Option B:	$\frac{1}{2}$
Option C:	1
Option D:	2

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Q9.	Find constants a, b if $f(z) = (3x^2y + 2x^2 + ay^3 - 2y^2) + i(bxy - x^3 + 3xy^2)$ is analytic.
Option A:	$a = 1, b = 4$
Option B:	$a = 4, b = 1$
Option C:	$a = -1, b = 4$
Option D:	$a = -1, b = -4$
Q10.	The function $f_3(x) = ax^2 - \frac{1}{2}$ is orthogonal to functions $f_1(x) = 1$ and $f_2(x) = x$ in the interval $(-1, 1)$ . The value of a will be
Option A:	3
Option B:	$\frac{3}{2}$
Option C:	0
Option D:	None of these.
Q11.	Find the analytic function whose real part is $x^2 - y^2 + 3y - 2x + 3$ .
Option A:	$f(z) = z^2 - 2z + 3zi$
Option B:	$f(z) = z^2 - 2z - 3zi$
Option C:	$f(z) = z^2 + 3z - 2zi$
Option D:	$f(z) = z^2 - 3z - 3zi + 4$
Q12.	$L(\int_0^t \int_0^t \int_0^t \sin u \, du^3) = \underline{\hspace{2cm}}$
Option A:	$\frac{1}{s^3(s^2 + 1)}$
Option B:	$\frac{s^2}{(s^2 + 1)}$
Option C:	$\frac{s}{(s + 1)^2}$
Option D:	$\frac{1}{s^2(s^2 + 1)}$
Q13.	Find value of $b_n$ in the Fourier expansion of function $f(x) = (2 - x^2)$ in the interval $(0, 2)$ .
Option A:	$\frac{2}{n\pi} + \frac{2}{n^3\pi^3}$
Option B:	$\frac{2}{n\pi}$
Option C:	$\frac{4}{n\pi}$

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Option D:	$\frac{4}{n^3 \pi^3}$								
Q14.	Find the value of $L^{-1}[\log(s^2 - 7s + 10)]$ .								
Option A:	$-\frac{1}{t}(e^{5t} - e^{-2t})$								
Option B:	$\frac{1}{t}(e^{5t} + e^{2t})$								
Option C:	$-\frac{1}{t}(e^{2t} - e^{5t})$								
Option D:	$-\frac{1}{t}(e^{5t} + e^{2t})$								
Q15.	The following are the marks scored by 7 students in two tests in a subject. Calculate Karl Pearson's coefficient of correlation from the following data.								
	Marks in Test 1	12	9	8	10	11	13	7	
	Marks in Test 2	14	8	6	9	11	12	3	
Option A:	0.95								
Option B:	-0.95								
Option C:	0.15								
Option D:	0.53								
Q16.	Evaluate $L^{-1}\left[\frac{1}{(s-2)^4}\right]$ .								
Option A:	$e^{2t} \frac{t^3}{3!}$								
Option B:	$e^{2t} \frac{t^5}{5!}$								
Option C:	$e^{-2t} \frac{t^4}{4!}$								
Option D:	$e^{-2t} \frac{t^5}{5!}$								
Q17.	Following are ranks of students in Physics and Chemistry. Find Spearman Rank correlation coefficient.								
	Rank in Physics	1	2	3	4	5	6	7	8
	Rank in Chemistry	2	4	1	5	3	8	7	6
Option A:	0.89								
Option B:	0.74								
Option C:	0.29								
Option D:	0.98								
Q18.	If $f(z) = r^3 \cos k\theta + ir^k \sin k\theta$ is analytic then $k = \underline{\hspace{2cm}}$ .								

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Option A:	-4
Option B:	4
Option C:	-3
Option D:	3
Q19.	In half range cosine series of $f(x) = x$ in $(0,2)$ value of $b_n$ is
Option A:	1
Option B:	$\frac{4[(-1)^n - 1]}{n^2\pi^2}$
Option C:	$\frac{4[(-1)^n + 1]}{n^2\pi^2}$
Option D:	0
Q20.	$\int_0^\infty e^{-t} \operatorname{erf} 3\sqrt{t} dt = \underline{\hspace{2cm}}$
Option A:	$\frac{3}{\sqrt{10}}$
Option B:	$\frac{1}{\sqrt{5}}$
Option C:	$\frac{9}{\sqrt{10}}$
Option D:	$\frac{2}{\sqrt{5}}$
Q21.	Find the image of interior of circle $ z =1$ under the transformation $W = \frac{1}{z}$
Option A:	interior of circle $ w =1$
Option B:	Exterior of circle $ w =1$
Option C:	$ w =1$
Option D:	real axis in W- plane
Q22.	$L^{-1}\left(\frac{3s}{(s-2)(s+1)}\right)$ is
Option A:	$2e^{2t} + e^{-t}$
Option B:	$2e^{-t} + e^{2t}$
Option C:	$e^{-t} - 2e^{-t}$
Option D:	$2e^{2t} - e^{-t}$
Q23.	$L^{-1}\left(\frac{1}{(s+2)^6}\right)$ is
Option A:	$e^{-2t} \frac{t^5}{5!}$

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Option B:	$e^{-2t} \frac{t^6}{5!}$
Option C:	$e^{2t} \frac{t^5}{5!}$
Option D:	$e^{-2t} \frac{t^6}{6!}$
Q24.	$Z^{-1}\left(\frac{2z}{z-a}\right)$ for $ z  >  a $ is
Option A:	$2a^k$
Option B:	$a^k$
Option C:	$2a^{-k}$
Option D:	None
Q25.	Given $\sum X = 250 ; \sum Y = 300 , \sum XY = 7900 , \sum X^2 = 6500 ; \sum Y^2 = 10000$ and $n = 10$ (in usual notation) The regression coefficient of X on Y is
Option A:	0.4
Option B:	4
Option C:	1.6
Option D:	40